University Bulletins

Series IV, Number 5

The University of Nebraska

The Schools of Agriculture, Sugar Industry, Mechanic Arts, Domestic Science, Art, and Music

Special Collegiate Courses

The University Bulletins are issued every six weeks, at least six numbers in each collegiate year.

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LINCOLN
The University Press
June, 1899

CALENDAR

1899

September 12, T.—15, F., Undergraduate examinations and registration

September 16, S., Annual opening address by the Chancellor

November 23, Th.—24, F., Thanksgiving recess

December 12, T., Regular meeting of the Board of Regents

December 22, F., First day of Christmas holidays

1900

January 2, T., Last day of Christmas holidays

January 22, M.—26, F., Final examinations of first semester and examinations for entrance to the second semester

January 29, M., Second semester begins

February 15, Th., Charter Day
Session of University Council
Regular meeting of Board of Regents
Fourth Midwinter Commencement

April 13, F.—16, M., Easter recess

April 18, T., Regular meeting of Board of Regents

June 2, S., Final recommendation by Faculties for degrees

COMMENCEMENT WEEK

June 3, Sun., 8 P. M., Baccalaureate sermon

June 4, M., Annual address before the College of Law

June 5, T., Class Day
4 P. M., Annual meeting of Board of Regents
8 P. M., Commencement concert

June 6, W., Alumni Day
10 A. M. to 2 P. M., Class reunions and dinners
2 P. M., Phi Beta Kappa oration and banquet
3 P. M., Annual business meetings of the alumni of the various Colleges
4 P. M., Fifth annual report of the Chancellor before the alumni of all Colleges
8 P. M., Alumni address before the College of Literature, Science, and the Arts, and the Industrial College

June 7, Th., Twenty-eighth Annual Commencement
10 to 12 A. M., The Commencement procession, oration, and conferring of degrees
2 P. M., Luncheon and annual session of the University Council
8 P. M., Chancellor's reception
9 P. M., College of Law: Annual reunion and banquet

THE SCHOOL OF AGRICULTURE

THE FACULTY

*George Edwin MacLean, LL. D., Chancellor

Albert E. Davisson, A. B., Director
T. Lyttleton Lyon, B. S. A., Associate Professor of Agriculture
Hudson H. Nicholson, A. M., Professor of Chemistry
Charles E. Bessey, LL. D., Professor of Botany
Clark F. Ansley, A. B., Professor of English
DeWitt B. Brace, Ph. D., Professor of Physics
Ellery W. Davis, Ph. D., Professor of Mathematics
Lawrence Bruner, B. S., Professor of Entomology
Albert T. Peters, D. V. S., Investigator in Animal Diseases
W. G. Langworthy Taylor, LL. B., Professor of Economic Science
O. V. P. Stout, C. E., Professor of Agricultural Engineering
Charles R. Richards, M. M. E., Professor of Practical Mechanics
Rollins A. Emerson, B. Sc., Assistant Professor of Horticulture
George H. Morse, B. E. E., Instructor in Drawing

STATUS

The School of Agriculture is a secondary technical school. The technical instruction offered is in subjects pertaining to farming. This instruction is identical with that given in the Winter Course in Agriculture. In addition are pursued certain general educational studies of high school grade.

OBJECT

The course is designed to train young men and women for greater usefulness on the farm. It also furnishes a

*Resigned.

preparation which will enable the student, at the completion of the course, to enter the Technical Agricultural Group in the University.

REQUIREMENTS FOR ADMISSION

The school is open to young men and women of sixteen years of age, or over, who are not otherwise registered in the University, and who pass successfully an examination upon the following subjects: Arithmetic, Grammar, Geography, United States History, Physiology, Reading, Spelling, Writing. Examination upon these subjects will be of the same character as those ordinarily presented for entrance to the ninth grade of the public schools.

THE SCHOOL CALENDAR

The school year is divided into a fall, winter, and spring term of fourteen, twelve, and ten weeks respectively. The School calendar otherwise is the same as that of the University. First term opens Saturday, September 16, Second term Tuesday, January 2, Third term Saturday, March 24.

COURSE OF STUDY

I.

1		2		3	
Mathematics	5	Mathematics	5	Mathematics	5
English	5	English	3	English	5
Botany	5	*Soils	3	Botany	5
*Drawing	1	Dairying	3	*Drawing	1
*Shop-work	2	*Farm accounts	2	*Shop-work	2
	—	*Injurious insects	1		—
	18	*Plant pests	1		18
			—		
			18		

II.

1		2		3	
Mathematics	5	Mathematics	5	Mathematics	5
English	3	English	3	English	3
Chemistry	2	Chemistry	2	Chemistry	2
Physics	3	*Horticulture	3	Physics	3
Entomology	2	*Stock-breeding	2	Entomology	2
*Drawing	1	*Stock-feeding	3	*Drawing	1
*Shop-work	2		18	*Shop-work	2
	18				18

III.

1		2		3	
Mathematics	5	Mathematics	5	Mathematics	5
Language (Lat. El.)	5	Language (Lat. El.)	5	Language (Lat. El.)	5
History	5	*Diseases of Animals	3	History	5
*Drawing	1	*Field crops	3	*Drawing	1
*Shop-work	2	*Agricultural Mechanics	1	*Shop-work	2
	18	*Agricultural Engineering	1		18
			18		

*Subjects marked with a star may be omitted by women and replaced by an equivalent amount of work in domestic science.

SYNOPSES OF COURSES

Soils, Plants, and their Relation

Origin of soils. Physical composition of soils. What a physical analysis of soil shows. Relation of physical structure to moisture. Capillarity. Forms in which water exist in soils. Movement of water in soils. Methods for conservation of soil moisture. Chemical composition of soils. Explanation of chemical analysis. What a chemical analysis shows. Available plant food. Nitrification. Effect of tillage on the soil. Composition of the air. Composition of plants. Relation of plants to the air and soil. Leguminous plants. Effect of tillage on the plant. Barn-yard manure and commercial fertilizers.

In this course the nature and condition of soils will be studied particularly with regard to their relation to fertility and moisture. The effect of tillage upon the soil, and thus indirectly upon the plant, will be explained, and likewise the effect of cultivation. The methods of soil treatment for the conservation of moisture will be dwelt upon at length.

The object is to make the student understand the possibilities of the soil, and by means of such an understanding be led to practice an intelligent treatment, adapting himself to the conditions of drought or excessive moisture, as the case may be. A true appreciation of the value of the use of farm-yard manure, and its rational use, is also aimed at. Commercial fertilizers, such as have been shown by experiment to be profitably used in this state, will be treated of.

Animal Husbandry

STOCK FEEDING

Composition and digestibility of feeding stuffs. Laws of nutrition. Feeding standards. Compounding of rations. Feeding for growth, fattening, milk, etc. Effect of food on the quality of meat, milk, and butter. Preservation and preparation of fodders.

BREEDS AND BREEDING OF STOCK

Short history of the different breeds. Characteristics of the different breeds. Judging by means of score card. Heredity, atavism, prepotency, variation, in-breeding, line-breeding, etc.

The aim of this work is to enable the student to use to the best advantage the feeding stuffs at his disposal and to make of him, should he possess the natural qualifications, a successful breeder and judge of stock.

Farm Accounts

A system of bookkeeping which, while being simple, yet enables the farmer to tell just what his profit or loss may have been in any partcular line of his business.

Practice in the different forms of business operations, as drawing up notes, contracts, etc. Talks on the different kinds of

negotiable paper, and the various forms of endorsement and their effect, business forms and correspondence.

Farm Dairying

Practice in the use of several makes of hand separators, and in the deep setting of milk. Careful instruction in the handling and ripening of cream, and in churning, washing, salting, working, printing, coloring, judging, and packing of butter.

Practice in the manipulation of the Babcock test, in testing whole milk, skimmed milk, buttermilk, and cream, and in the detection of wastes and adulterations.

Diseases of Farm Animals and Their Treatment

External diseases. Internal diseases. Infectious diseases.

The lectures on animal diseases are designed particularly for the stock raiser, being of such a nature as to be readily understood by those who have not had any previous training in that line. The symptoms of all the commoner diseases of farm animals and treatment of minor diseases are carefully studied, and this is supplemented with such practice as the town and surrounding country affords. Special attention is given to the prevention of diseases in stock.

Chemistry

Study of the commonly occurring elements and their principal compounds. Lectures, recitations, and laboratory.

Household Economics

food, its nature and preparation

a. Nutritive values and principal constituents of food in general.

b. Special study of typical foods with reference to—

1. Food value.
2. Methods of testing for adulteration.
3. Best and most economical methods of preparation of food material for table use.

Food to be studied as above: Water—Simple methods for detecting impurities; methods of purifying water. Milk.

Bread. Yeast. Baking powders—What constitutes a good powder; how to prepare the same. Meats. Vegetables. Canned fruits. Beverages. Condiments.

CLEANING—MECHANICAL AND CHEMICAL

Use of chemicals in the kitchen and laundry. How to make cleaning easier by applying chemical principles in the cleaning of clothes, furniture, woodwork, dishes, silverware, etc. How to soften water. Study of the composition, value, and use of soaps, washing powders, polishing powders, bluing, etc.

GENERAL CARE OF THE HOUSE FROM A SANITARY POINT OF VIEW

Ventilation, necessity of pure air and sunlight. Plumbing. Relation of outhouses to wells. Disinfectants, what they are and how to use them in health and sickness.

HORTICULTURE

Fruit growing and vegetable gardening. A brief discussion of the most important fruits and vegetables of the state with special reference to practical methods of culture, including means of overcoming insects and other enemies.

POLITICAL ECONOMY

The object of this course is to present, in their simplest form, the most salient economic facts. No attempt will be made to draw theoretical inferences nor to provoke theoretical investigations. The purpose of instruction will have been accomplished if the student shall have acquired a large store of historical information which will in the future tend to give direction and steadiness to his views and utterances as an American citizen.

ENGLISH ECONOMIC HISTORY

This includes among others, the following topics: Physical and industrial conditions. Guilds and the apprentice system. Domestic manufacture. Trading companies and the colonial system. The industrial revolution. The factory system. Trade unions. Labor and capital. The old and the new agriculture. Wages and poor relief. Money, credit, and finance.

ECONOMIC HISTORY OF THE UNITED STATES

Industrial and agricultural conditions. Foreign commerce and tariff. Internal commerce and transportation. Financial history. Coinage and currency. Labor organizations and movements.

ENGLISH

a. Reading from classic authors, mainly prose, three hours a week. Work is so arranged as to bring the pupil into contact with as much good literature as possible, to the end that he may become familiar with clear, strong English style.

b. English Composition, with the essentials of Grammar and Rhetoric, two hours a week. The purpose of this work is to give readiness and correctness in the use of the language. West's English Grammar for beginners is recommended as a text in Grammar and what Rhetoric is given will not require a text.

AGRICULTURAL ENGINEERING AND HYDRAULICS

Farm survey with chain. Drainage leveling. Topographical survey for irrigation or landscape gardening. Measurement and division of water. Application to crops. Minor irrigation structures.

AGRICULTURAL MECHANICS

Draft of vehicles and field implements in fields, on poor roads, on good roads. Wind wheels and pumps. Strength of timber, ventilation of buildings. Bearing power of soils as foundations. Elementary study of heat, as related to warming and ventilation, protection against freezing, economic generation and use.

BOTANY

The elementary study of the structure and physiology of plants, followed by a more careful study of selected types of plants. Especial emphasis will be laid upon the study of those plants which are of interest to us either because of their usefulness in everyday life, or on account of their harmfulness, as in the case of the parasitic and saprophytic fungi.

A commodious laboratory has been fitted up with tables, com-

pound microscopes, glassware, and other apparatus, and material for study, sufficient for the immediate uses of the students, while in emergencies additional apparatus and material from the large laboratories and collections of the Department of Botany in the Univeristy may be drawn upon.

Plant Pests

A course of lectures and readings on the common weeds and other harmful plants which infest Nebraska farms and gardens, illustrated by specimens of the plants themselves and their seeds.

Agricultural Zoology

Brief account of Anatomy of Animals. Development in the higher forms. Sterility, fertility, monsters, etc. Relations to breeding. Animals helpful to the farmer, excluding those called domestic animals. Habits, enemies, protection.

Injurious animals—Suppression, particularly parasites, and epidemics. Prevention. Meat inspection. Raising pure meat.

All of the topics will be treated in a simple way without technical terms, etc., with the aim that the student may acqure a correct idea of the relation of the various animals to his success.

Carpentry and Blacksmithing

The care and use of carpenters' tools, and the methods of constructing various forms of joints, splices, dovetails, and panels.

forge work

A short course of exercises showing the methods of drawing, upsetting, bending, welding, and tempering.

EXPENSES

Tuition is free. The matriculation fee is five dollars, payable to the Treasurer of the University at the beginning of the first year only. A deposit of four dollars is required at the beginning of each year to cover breakage, loss of tools, and waste of material. At the end of the year the balance of this deposit is returned to the student.

Books and other incidentals for the entire year will cost about eight dollars.

In a private family table board may be obtained for $2.25 to $2.50 per week. Some of the students' clubs give board as low as $2.00 per week.

Room rent varies from $2.00 to $3.00 and upward per month.

THE WINTER COURSE IN AGRICULTURE

The Winter Course in Agriculture will begin January 2, 1900, and continue for eleven weeks. The course is designed to meet the demand for simple and practical instruction in Agriculture. It will occupy but a short time, and that at a season of the year when farm work is least pressing. The course continues through two winters.

No examinations for entrance are required, but applicants will be expected to have a good knowledge of the primary English branches as taught in the district schools, and must be at least sixteen years of age.

In preparing the course of instruction the object has been to make it as practicable as possible, to give the student something that will be of value to him when he returns to the farm. The instruction is given by means of lectures and actual practice. The practice, however, as will be seen below, is not in the work of the farm with which every farmer is familiar, but in operations requiring skill and knowledge, and which are not ordinarily acquired on the farm.

The methods of instruction are adapted to students of all ages, those taking the work during the last term varying from sixteen to forty-five years of age. As was

to be expected, those having had the most practical experience seemed to receive the greatest benefit from the instruction.

The instruction offered is as follows: Soils and crops. Diseases of farm animals. Breeding of live stock. Feeding of live stock. Farm dairying. Horticulture. Agricultural engineering and hydraulics. Carpentry or blacksmithing. Insects injurious to crops. Plant pests. Farm accounts.

The libraries, museums, and other accessories to the University will be available to the student in the Winter Course.

The Agricultural Students' Club meets weekly during the session of the Winter Course. The Club is organized for the discussion of subjects pertaining to Agriculture and personal culture.

There is a registration fee of one dollar; books, dairy suits, etc., will cost about three dollars. There is also a deposit of one dollar required to cover breakage in the carpenter and forge shops.

Table board ranges from two to two dollars and a half per week. Rent of furnished room varies from fifty cents to one dollar per week.

The probable cost to each student will be about as follows:

Room rent, 11 weeks at 75c	$8 25
Table board, 11 weeks at $2.25	24 75
Books, etc.	3 00
Shop deposit	1 00
Registration fee	1 00
	$38 00

Students will register Tuesday, January 2, 1900. The term closes March 16, 1900.

THE SUGAR SCHOOL

THE FACULTY

*George Edwin MacLean, LL. D., Chancellor

Hudson H. Nicholson, A. M., Director and Professor of Chemistry
Morgan Brooks, M. E., Professor of Electrical and Steam Engineering
T. L. Lyon, B. S. A., Associate Professor of Agriculture
Charles R. Richards, M. M. E., Professor of Mechanical Engineering in charge of the Department of Practical Mechanics
Oscar V. P. Stout, C. E., Professor of Civil Engineering
DeWitt B. Brace, Ph. D., Professor of Physics
Robert S. Hiltner, B. Sc., Assistant Chemist

This school is open to young men of sixteen years of age or over who, in the opinion of those in charge of the school, have had the requisite training for properly carrying on the work.

The ninth annual session will open at the University in September, 1899.

The objects of the school are to give instruction in the best methods of sugar beet culture and in the details of factory methods of sugar making.

Especial attention will be given to the chemical control of sugar factory operations.

Applicants for registration must matriculate as students in the University (that is, pay the fee of five dollars,

*Resigned.

which will entitle them to take this and other special work in the instruction for a period of four years), and make the usual deposit for breakage and other laboratory expenses. The latter will not exceed six dollars for the entire course.

It has been thought best to expand the curriculum of the Sugar School somewhat and to open its course to students at the beginning of the University year instead of in the middle of the year as heretofore.

The school will be in session during the manufacturing season and classes will have the opportunity of visiting the sugar factories while in operation, and the large beet farms during harvest time.

COURSES OF INSTRUCTION

FIRST SEMESTER

1. Elementary Chemistry as applied in the sugar factory. Three hours. Specific directions for the analysis of the following substances: Sugar beets, sugar, syrup, masse-cuite, molasses, thin juice, diffusion juice, sweet water, calcium saccharate, strontium saccharate, press cake, bone-black, exhausted cossetts, carbonation gas.

3. Technology of Sugar Manufacture. One hour. Beet silos. Hydraulic beet carrier. Washing machine for beets. Weighing and slicing the beets. Diffusion process. Beet refuse and its utilization. Purifying of juice. Lime kiln. Preparation of lime milk. Lime milk pump. Carbonic acid washer. Carbonic acid pump. Mixer for lime milk and juice. Double carbonation. Automatic juice pump. Filter press. Washing of lime cakes. Mechanical filtration. Bone-black filtration. Reviving the bone-black. Washing machine. Acidifying the bone-black. Roasting the bone-black. Evaporation. Double, triple, quadruple effects. Air pump, wet and dry. Condenser for wet air pump. Con-

denser for dry air pump. Vacuum pan. Mixer for massecuite. Centrifugals. Sugar conveyor and elevator. Granulator. Molasses and its utilization.

5. Mechanical drawing. Two hours. Copy drawing, freehand; machine sketching; lines and shading; tracing and blue printing.

7. Shop Work. Course 1. Three hours.
   a. Bench work in wood: A systematic course of exercises showing the use of the different carpenters' tools, and the method of constructing various forms of splices, dovetails, joints, panels, etc.
   b. Wood turning: A systematic course of exercises showing the method of cutting square shoulders, turning plain and compound curves, chucking, etc.

9. Sugar Beet Culture. One hour. History of the culture of the sugar beet. Effect upon general agriculture of sugar beet culture. Varieties of the sugar beet. Composition and structure of the beet plant. Soils. Fertilization of the soil. Position of the beet crop in the system of crop rotation. Preparation of the soil. Planting the seed. Cultivation. Harvesting. Preservation of the beet root. Seed production. Insect enemies and diseases of the beet. Feeding value of sugar beets, and of sugar factory residue.

11. English. Five hours.
   a. Reading from classic authors, mainly prose. Three hours a week.
   b. English composition, with the essentials of grammar and rhetoric. Two hours a week.

15. Steam and Electrical Machinery. (Course 21 in department of Electrical Engineering.) Two hours. Lectures on the elementary theory of the steam engine, elementary treatment of the forms of engines, valve mechanisms, indicator practice and engine economy, forms of boilers, boiler settings, care and management of boilers, fuels, accessory steam apparatus. The gas engine. Elementary theory of the dynamo, electric lighting and power, electric distribution and wiring, water power, power transmission by gears, belts, ropes, etc.

SECOND SEMESTER

2. Continuation of Course 1. Three hours. Special attention to methods of anaylses of cane sugars in presence of dextrose and raffinose. Methods of analyses of water, limestone, coal and coke, etc.

4. Physics. Two hours. Special attention is given to optical instruments. Light. Polarization of light. Polariscopes. Care and management of polariscopes in the sugar house.

6. Continuation of Course 5. Two hours.

8. Shop Work. Course 2. Three hours.
   a. Pattern-making: The construction of various forms of patterns, core boxes, etc.
   b. Foundry work: Bench and floor moulding, core-making, and casting in iron and brass.

10. Laboratory practice in Engineering. Two hours.

12. Irrigation Engineering. Two hours. Grades, cross-sections, and capacity of canals. Surveys. Designs of structures. Sources of water supply. Analysis of hydrographic data. Nebraska streams. Return and seepage waters. Irrigation by pumping. Organization. Administration. Legal and economic principles.

16. Continuation of Course 15. Two hours. (Course 22 in department of Electrical Engineering.)

THE SCHOOL OF MECHANIC ARTS

A TWO-YEARS COURSE

FACULTY

*George Edwin MacLean, LL. D., Chancellor

Charles Russ Richards, M. M. E., Director, Professor of Mechanical Engineering and Practical Mechanics
Clark F. Ansley, A. B., Professor of English
DeWitt B. Brace, Ph. D., Professor of Physics
Morgan Brooks, M. E., Professor of Electrical Engineering
Ellery W. Davis, Ph. D., Professor of Mathematics
Hudson H. Nicholson, A. M., Professor of Chemistry
Carl C. Engberg, Ph. D., Instructor in Mathematics
David Hawksworth, B. Sc., Instructor in Mechanical Drawing
Anna E. Davis, Instructor in English
Robert E. Moritz, Ph. M., Instructor in Mathematics
C. H. Morse, Instructor in Machine Design and Electrical Engineering
William W. Votaw, Instructor in Practical Mechanics

GENERAL ANNOUNCEMENTS

The School of Mechanic Arts meets a demand for instruction in practical mechanical work. The shops and laboratories of the University of Nebraska are made available by this school to young men from the common or district schools. There are many young men having neither the time nor the money to complete a collegiate course at the University, who will here find an oppor-

*Resigned.

tunity of securing a practical education, fitting them for some useful place in life.

Primarily, the School of Mechanic Arts is intended for those young men who expect to enter some one of the mechanical trades, and who desire a scientific basis for this later work, although it is hoped that in many cases the stimulus given by the school will be such that a collegiate course in one of the engineering groups will be pursued.

The school is in no sense a trade school, although the principles of some of the more important mechanical trades are taught. The student obtains a better conception of the relative importance of the different mechanical operations, and he is enabled to determine what particular branch of mechanical work he can most successfully pursue.

THE SCHOOL YEAR

The School year coincides with the University year, which embraces thirty-eight weeks, beginning September 12th, 1899, and closing the first week in June, 1900. It is especially desirable that students report promptly at the beginning of the school year, as it will be found difficult to do the advanced work until the back work has been made up.

REQUIREMENTS FOR ADMISSION

The school is open to young men of sixteen years of age, or over, who are not otherwise registered in the University, and who, in the opinion of those in charge of the school, have had the requisite training for properly car-

rying on the work. The applicant should understand arithmetic and elementary English grammar.

Candidates for admission will be required to present a certificate of good character. Students who enter after the beginning of the semester will be required to take examinations, at the discretion of the heads of the departments in which work is taken. It is impossible for students to enter this school at the beginning of the second semester.

SCHEDULE OF COURSES OF INSTRUCTION

FIRST YEAR

First Semester

Mathematics, A .....5 hours
English, A .....5 "
Lectures on Mechanical Practice (Mech. Eng., 19).....2 "
Mechanical Drawing* (M. D., 9).....2 "
Shop Work* (Mech. Eng., 1).....3 "
a. Lectures
b. Bench Work in Wood
c. Wood Turning
d. Molding

Second Semester

Mathematics, B .....5 hours
English, B .....5 "
Lectures on Mechanical Practice (Mech. Eng., 14).....2 "
Mechanical Drawing (M. D., 10).....2 "
Shop Work (Mech. Eng., 2).....3 "
a. Pattern-making
b. Foundry Work

SECOND YEAR

First Semester

Mathematics, C .....4 hours
Theme Writing (English, C).....1 hour

*Three hours' work in the shops or drawing room count for one hour credit in the schedule.

Physics .....3 hours
Lectures on Mechanical Practice (Mech. Eng., 21).....2 "
Lectures on Steam Machinery (Mech. Eng., 23).....2 "
Mechanical Drawing (Mech. Dr., 11).....2 "
Shop Work (Mech. Eng., 3).....4 "
a. Forging in Iron and Steel
b. Filing, Chipping, and Scraping

Second Semester

Mathematics, D .....5 hours
Theme Writing (English, D).....1 hour
Physics .....3 hours
Lectures on Electrical Machinery (Elec. Eng.).....2 "
Machine Design (Mech. Dr., 12).....2 "
Shop Work .....5 "
a. Filing and Fitting
b. Machine Work in Metals

DESCRIPTION OF COURSES OF INSTRUCTION

MATHEMATICS

Many of the practical problems which must be solved in the shop would be exceedingly difficult without a knowledge of mathematics, hence the mathematics given in this course is planned especially for the mechanic, with reference to its application to mechanical work. The course includes a brief review of arithmetic; tables as labor savers; curve plotting by tables; exponential and logarithmic tables, and the slide rule; computation by logarithms; mensuration, with a sketch of its geometric foundation; use of formulæ in computation; graphical methods in computation; trigonometric functions and their use; equations of the first, second, and third degree; geometric meanings and graphic solutions; solution by tables; differentiation and integration, with their geometric and mechanical significance; use of tables of integrals, geometric integration, mechanical integrators.

ENGLISH

The ability to speak and write correct English readily should be looked upon as part of the training of every educated man. For the mechanic, it has a practical value as well, since it will

enable him to occupy positions for which, without such ability, he would be unfit. The purpose of the instruction in English, as in other subjects taught in the School, is to give the student the greatest amount of practical training.

PHYSICS

The laws of motion, of heat, of electricity, and of light have a very direct bearing upon mechanical design and construction. A knowledge of the various physical phenomena is of the greatest value to the mechanic, being of direct assistance in the solution of many of the practical problems that will be presented to him. During the second year, three hours per week for the first semester and five hours for the second semester, including recitations and lectures with demonstrations, will be devoted to a course in general elementary physics.

CHEMISTRY

If the student expects to engage in some particular line of mechanical work, where a knowledge of chemistry will be useful, he may substitute chemistry for physics in the second year of the course. This substitution will be allowed only when sufficient reasons for such a change are presented. In general, the course in physics will be the most valuable to students in the school.

MECHANICAL PRACTICE

During the first year and a half of the course, two lectures a week are given on Mechanical Practice. They run parallel with the work in the shop, and are intended in part to give a better knowledge of the work done therein, and at the same time to discuss those things which the intelligent mechanic must know, but which do not necessarily form a part of his practical shop work. These lectures include a discussion of the standards of length; the form and action of carpenters' and turners' tools; the physical properties of timber; simple framed structures, floors, roofs, etc.; plans, specifications, and estimates; the metallurgy of iron and steel; the forms and construction of patterns and core-boxes; molding and foundry practice; wood-working machinery; forging tools and machinery; files; machine work in metals; and general metal-working machinery.

STEAM AND ELECTRICAL MACHINERY

A number of the more important engineering problems of peculiar interest to the mechanic, who may be called upon to build, repair, or run engines, dynamos, boilers, or other apparatus for the generation or transmission of power, will be discussed in the lectures on steam and electrical machinery, including the elementary theory of the steam engine, forms of engines, valve mechanism, indicator practice and engine economy; forms of boilers, boiler settings, care and management of boilers; fuels; accessory steam machinery; the gas engine; elementary theory of the dynamo; electric lighting; electric railways; electrical distribution and wiring; water power; power transmission by gears, belts, ropes, electricity, etc.

MECHANICAL DRAWING

All mechanical construction is done from mechanical drawings, which to the mechanic should represent clearly the ideas of the designer. It is therefore necessary that the skilled mechanic be capable of interpreting drawings so that he may easily reproduce in wood or iron the things therein represented. Six hours each week throughout the course are devoted to mechanical drawings, and the student is then not only rendered capable of interpreting drawings, but he will have acquired the skill and ability to make them himself. The instruction includes the care and use of the drawing instruments, drawing from copy, machine sketching, detail drawing, tracing and blue printing, line shading, tinting, drawing from dictation, gears, parts of machines, etc.

SHOP WORK

The work in the shops is eminently practical, the instruction in each branch being given by a systematic course of exercises, showing the use of the different tools and the methods of mechanical construction. After the completion of any given set of exercises, the principles there learned will be applied in the construction of some complete piece of work. Since the work is solely for construction, and there is as little repetition as possible, rapidity of execution is not expected or desired. The principles of tool use and mechanical construction are taught, but great dexterity and rapidity of execution, which result from

long practice, can only be obtained by outside work. The work done is as follows:

Bench Work in Wood.—A systematic course of exercises showing the use of the different carpenters' tools, and the methods of constructing various forms of splices, dovetails, joints, panels, etc. Nine hours' work each week for one-half of the first semester of the first year.

Wood Turning.—A systematic course of exercises showing the methods of turning plain cylinders, cutting square shoulders, turning plain and compound curves, chucking, etc. Nine hours' work each week for one-half of the first semester of the first year.

Pattern-Making.—The construction of various forms of patterns, core-boxes, etc., for parts of machines. Nine hours each week during the second semester of the first year.

Foundry Work.—Bench and floor molding, core-making, and casting in iron and brass. Taken in connection with the course in pattern-making.

Forging in Iron and Steel.—A systematic course of exercises in drawing, up-setting, bending, welding, and tempering. Applications of the above in the construction of more elaborate finished pieces of work. Nine hours each week during the first semester of the second year.

Filing, Chipping, and Scraping.—The use of the cold chisel, the file, and the scraper. Exercises in chipping straight and grooved surfaces; surface and round filing; polishing, and the construction of surface plates. Three hours each week during the whole of the second year.

Machine Work in Metals.—Plain and taper turning, boring, thread cutting, drilling, planing, milling, and polishing; the construction of taps, dies, drills, reamers, and complete machines; practice in lining up shafting, etc. Fifteen hours each week during the second semester of the second year.

OTHER PRACTICAL INSTRUCTION

During the second year of the course, each student will be given practice in the care and management of the power boilers, the steam engines, and the various dynamo-electric machines, together with indicator practice, valve setting, and engine and boiler tests.

FACILITIES FOR INSTRUCTION

The Wood Shop contains twenty-five carpenters' benches, each equipped with a quick-action vise, and a complete set of carpenters' tools; sixteen ten-inch swing speed lathes, each equipped with two sets of turning tools; one large pattern-makers' lathe; one double revolving cross-cut and rip saw; one scroll saw; one universal trimmer; two grindstones; and numerous special small tools.

The Forge Shop is equipped with twenty-four stationary forges with a like number of anvils and sets of small tools. The smoke is removed and the blast supplied to the forges by a seventy-inch, double ended fan. This shop also contains a hand forge; a tempering furnace; a hand punch and shear; and benches with blacksmiths' vises.

The Foundry contains eighteen molders' benches, with a like number of sets of molders' tools for bench and floor molding; a twenty-four-inch cupola furnace; a core oven; and the necessary ladles, flasks, etc.

The Machine Shop is not yet fully equipped. At the present time it contains ten machinists' benches, each equipped with a vise and set of small tools for vise work in metals, a twenty-six-inch, back geared and power feed drill press; a sixteen-inch shaper; a fourteen-inch screw-cutting engine lathe; and a wet and dry emery grinder.

The Engineering Laboratories contain a number of steam engines, boilers, dynamos, motors, etc., together with various instruments for testing the same.

The Drawing-room is a large, well-lighted room, located in the second story of the Library Building. It contains fifty-four drawing tables, and a large number of drawing boards. All paper and drafting instruments are supplied by the student.

Technical Library.—There are on file in the department libraries a number of the leading engineering journals, together with a number of reference books, bound volumes of engineering papers, and proceedings of engineering societies. The student will also have free access to all the books and papers in the general library.

EXPENSES

Tuition is free. The matriculation fee is $5.00, payable to the Treasurer of the University at the beginning of the first year only. A deposit of $5.00 is required at the beginning of each year, to cover breakage and loss of tools, and waste of material. At the end of the year the balance of this deposit is returned to the student.

Upon entering the school, the student must provide himself with a set of drafting instruments, costing about $10.00, and books, apparel for work in the shops, and incidentals, costing about $3.00. Books and other incidentals for the entire year will cost about $5.00.

In a private family table board may be obtained for $2.25 or $2.50 per week. Some of the students' clubs give board as low as $2.00 per week. Room rent varies from $2.00 to $3.00 per month, and upward.

The first year in the school will probably cost about as follows, exclusive of clothing, washing, and other incidentals:

Matriculation fee	$5 00
Drafting instruments	10 00
Books, etc.	5 00
Waste of material and loss of tools (estimated)	2 00
Table board, 38 weeks at $2	76 00
Room rent, 9 months at $2.50	22 50
Total	$120 50

The expenses of the second year will be reduced $15.00 by the first two items. In some cases it is possible for students to secure employment during their spare time, and thus slightly reduce the above expenses.

THE SCHOOL OF DOMESTIC SCIENCE.

A TWO-YEARS COURSE

THE FACULTY

*George Edwin MacLean, LL. D., Chancellor

Rosa Bouton, A. M., Director
Charles E. Bessey, LL. D., Professor of Botany
C. F. Ansley, A. B., Professor of English
DeWitt B. Brace, Ph. D., Professor of Physics
Ellery W. Davis, Ph. D., Professor of Mathematics
Hudson H. Nicholson, A. M., Professor of Chemistry
Charles E. Bessey, Ph. D., Professor of Botany
Lawrence Bruner, B. Sc., Professor of Entomology
William W. Hastings, Ph. D., Professor of Hygiene
Anne L. Barr, Instructor in Physical Training
R. E. Moritz, A. M., Instructor in Mathematics
Clyde B. Cooper, A. B., Instructor in English
George H. Morse, Instructor in Drawing
————, Instructor in Domestic Science

Primarily, the School of Domestic Science is intended for those young women who wish to prepare themselves to perform skillfully and intelligently those duties in the home which sooner or later come to almost every woman.

The school is in no sense simply a cooking school. The work is not merely mechanical, but educational in the truest sense of the word. The student will be trained to think as well as to do, and will come to realize the fact

*Resigned.

that the changes which take place in the cookery of food materials are as truly dependent upon scientific principles as are the changes ordinarily studied in scientific laboratories.

The school year coincides with the University year, which embraces thirty-eight weeks, beginning September 12 and closing the first week in June. Students should report promptly at the beginning of the school year.

REQUIREMENTS FOR ADMISSION

The school is open to young women of sixteen years of age, or over, who, in the opinion of those in charge of the school, have had the requisite training for properly carrying on the work. The applicant should understand arithmetic and elementary English grammar.

SCHEDULE OF COURSES OF INSTRUCTION IN SCHOOL OF DOMESTIC SCIENCE

FIRST YEAR

First Semester

Mathematics	5 hours
English	5 "
Chemistry	2 "
Hygiene	2 "
Physical training	1 hour
Domestic Science	2 hours
	17 "

Second Semester

Mathematics	5 hours
English	5 "
Chemistry	2 "
Botany	2 "
Physical training	1 hour
Domestic Science	2 hours
	17 "

SECOND YEAR

First Semester

Mathematics	4 hours
Theme writing	1 hour
Physics	3 hours
Drawing	2 "
Entomology	2 "
Chemistry of food	2 "
Domestic Science	2 hours
	16 "

Second Semester

Mathematics	5 hours
Theme writing	1 hour
Physics	3 hours
Drawing	2 "
Bacteriology	2 "
Home sanitation	2 "
Domestic Science	2 "
	17 "

DESCRIPTION OF COURSES OF INSTRUCTION

MATHEMATICS

The mathematics given in this course is planned with reference to its application to practical work. The course includes a brief review of arithmetic, tables as labor savers; curve plotting by tables; logarithmic tables, and the slide rule; computation by logarithms; mensuration, with a sketch of its geometric foundation; use of formulæ in computation; graphical methods in computation; trigonometric functions and their use; equations of the first, second, and third degree; geometric meanings and graphic solutions; solution by tables.

ENGLISH

During the first year the instruction will include reading from classic authors, mainly prose, three hours each week, and English composition with the essentials of grammar and rhetoric, two hours each week. The second year, one theme each week

will be required, the subject to be assigned by the instructor in English.

PHYSICS

Th laws of motion, of heat, of electricity, and of light have a very direct bearing upon the preparation of food and the sanitary arrangements of the home. A knowledge of the various physical phenonmena is of the greatest value to the homekeeper, being of direct assistance in the solution of many of the practical problems that will be presented to her. During the second year, three hours each week, including recitations and lectures with demonstrations, will be devoted to a course in general elementary physics.

CHEMISTRY

Very many of the operations performed in the preparation of food and in the general care of the home are chemical in their nature. For this reason a study of general chemistry forms a very important part of household science.

During the first year the commonly occurring elements and their compounds are studied. The first semester of the second year is devoted to a study of the chemistry of foods and their cookery; methods of detecting adulterations, etc. The second semester, the study of the chemistry of cleaning is taken up, together with home sanitation, which includes plumbing, ventilation, disinfection, etc. Lectures, recitations, and laboratory practice during entire course.

FREEHAND DRAWING

This work serves not only to train the hand to faithfully reproduce that which the eye perceives, but also to develop an appreciation of that which is beautiful in art and nature. Besides the drawing, some work in painting and wood-carving will be undertaken in this course.

Lectures will be given on the harmony of color and how to use one's means, be they large or small, to the best advantage in making home beautiful.

BIOLOGY

Household science necessarily includes a study of biology

because of the intimate relation existing between life and food. A knowledge of plant and animal life in many of its lower forms is indispensable to her who would intelligently prepare and preserve food. Two hours of botany will be given the second semester of the first year. During the second year instruction will be given in entomology two hours the first semester and in bacteriology two hours the second semester.

DOMESTIC SCIENCE

The aim is to make the entire work in this course educational; to train the mind, and develop character in the kitchen as well as in the laboratory. Special attention is directed to the fundamental principles of cookery and their application in the preparation of individual dishes. Practical work is done in cooking in a kitchen laboratory. Special attention is given to the most economical methods of cooking, as well as to those methods which shall render food most nutritious, palatable, and attractive.

PHYSICAL TRAINING AND HYGIENE

Every woman should have a knowledge of the wonderful mechanism of the human body and know how to take proper care of it. She needs also definite, systematic physical training. These needs are supplied by the Physical Training Department of the University. The members of the School of Domestic Science are given work in the regular classes in Hygiene and Physical Training in the University.

EXPENSES

Tuition is free. The matriculation fee is $5.00, payable to the Treasurer of the University at the beginning of the first year only. A deposit of six dollars is required in chemistry at the beginning of each year to cover breakage of apparatus, and waste of material. At the end of the year the balance of this deposit is returned to the student. In domestic science a five-dollar deposit is required to cover the cost of food materials used. No

balance is returned from this deposit. Books and other incidentals for the year will cost about ten dollars.

In a private family table board may be obtained for $2.25 to $3.00 per week. Some of the students' clubs give board as low as $2.00 per week.

Room rent varies from $2.50 to $4.00 per month and upwards.

THE SCHOOL OF ART

DIRECTOR ———, MRS. HENRIETTA M. BROCK

The University School of Fine Arts occupies rooms on the second floor of the Library Building. Besides the class rooms, which are well lighted, attractive, and completely equipped with easels, frames, and casts, there is a fire-proof gallery 60x70 feet, where art exhibitions and receptions are held during the school term. The annual winter exhibition of paintings by leading American and foreign artists and other minor exhibitions find an excellent setting in this beautiful room. It is lighted by large skylights during the day and by two hundred electric lights in the evening.

The school offers courses in drawing, painting, sculpture, and wood-carving. The School of Drawing and Painting is divided into four classes or sections, through each of which the student must pass in succession to attain the next higher one.

I. ELEMENTARY

Drawing from geometrical solids, still-life, and antique fragments, in outline, and light and shade.

II. INTERMEDIATE

Same, more advanced. Pen and ink. Perspective.

III. ANTIQUE

Heads and figures from cast. Still-life in colors.

IV. LIFE

Costume; life class. Work in wood-carving and china painting can be carried at any time during the course. Work in etching can be carried by students in the life class only.

Promotion from class to class is made through examinations held the first of every month. At these examinations each student is expected to hand in examples of the month's work for inspection. At each of these examinations the inspection committee will select the best of the work to be hung upon the wall. From these will be selected the work for the final examination.

A course of lectures on art topics will be given during the winter.

TUITION FEES

One lesson per week	$10 per semester
Two lessons per week	$18 per semester
Three lessons per week, with use of studio daily	$25 per semester

Special terms for china painting.

CHINA PAINTING

Instruction will be given in figure painting on porcelain. Flower painting from nature.

Enamels, conventional and all branches in decorative work.

An evening class will be conducted Tuesday evening of each week. This will be a class in design and preparatory work.

The class in painting will meet on the afternoons of Tuesday, Thursday, and Friday from 1:30 to 4:30.

TUITION FEES

One lesson per week	$12 per semester
Two lessons per week	$23 per semester
Three lessons per week	$33 per semester

Special arrangements made with persons desiring to take less than a semester's instruction.

THE AFFILIATED SCHOOL OF MUSIC

THE FACULTY

WILLARD KIMBALL, Oberlin; Leipzig; private pupil of Dr. Oscar Paul
Director; Harmony, Pipe-Organ

HENRY PURMORT EAMES, private pupil Madam Schumann and James Kwast
Pianoforte

JOHN RANDOLPH, Cincinnati College of Music; New England Conservatory of Music
Voice, General Theory

AUGUST HAGENOW, Leipzig Conservatory of Music
Violin, Instructor University Orchestra

EMILY METCALF PERKINS, Iowa College
Pianoforte

MRS. WILL OWEN JONES, New England Conservatory of Music
Pianoforte

MRS. MARION TREAT TAYLOR
Voice

WINIFRED HEARN
Assistant Instructor in Voice and Harmony

EUGENIA GETNER
Assistant Instructor in Voice

EARLE WEHN
Cornet, Leader University Cadet Band

LILLIE EICHE
Violoncello

HENRY S. WELLS
Clarinet

JOHN S. WOODS
Mandolin, Guitar, Banjo

EDWARD L. MOUCK
Practical Pianoforte Tuning

MARTHA HASSE
Practice Clavier

MARY KETTERING
Practice Clavier

NELLIE CAVE
Assistant Instructor in Pianoforte

MAE BILTGEN
Secretary

Affiliated with the University is the School of Music offering courses that are intended to give those who complete them the highest degree of proficiency. While is is impossible to specify the exact course for each individual, the following may be taken as fairly typical. The work indicated, or its equivalent, must be carried by all candidates for graduation.

Students may take any one or more of the courses outlined, either in classes or privately. But the candidate for graduation must pursue three courses, viz., the complete course in the science of music (including sight-singing, harmony, counterpoint, orchestration, history and theory of music); in instrumental music, either pianoforte, pipe-organ, violin, or voice; and one elective course.

This requirement is made in order to secure to one who seeks a diploma from the University such mastery of the principles and practice of musical art as will enable the graduate to secure and maintain an honored position in the best academies and colleges; to guard against a narrow and one-sided view of the subject, and to develop a

broad and generous musicianship which does not overestimate the value of virtuosity alone.

COURSES TO GRADUATION

I. Theory of Music: Text-book and lectures, twice each week for one year.

II. Sight-singing: Work in elementary University chorus, once each week for one year.

III. Elementary harmony: Notation, terminology, formation of chords, modulation; text-book, lectures, composition, and practice, twice each week for one year. This course must be preceded by Course II.

IV. Advanced harmony: Suspension, harmonizing melodies, with *canti firmi* in the different voices, enharmonics, figuration, four-to-eight-part writing, study of form, counterpoint, twice each week for one year.

V. Piano, Pipe-Organ, Violin, or Voice: Twice each week throughout the course.

PIANOFORTE

The course includes the systematic study of technical exercises for the development of the muscles of the hand and arm, the complete control of which is absolutely essential to a skillful interpretation of any composition of merit. In this work the Virgil Practice Clavier will be used for many who contemplate a thorough course and who need the strengthening of the muscles of hand and arm. This is the only toneless instrument that is a complete substitute for the piano for all practice. By its use the extensor or lifting muscles are developed, and a pure legato touch is secured. It has already achieved such astonishing results that many advanced players and artists are availing themselves of its use.

Throughout the course, études of various degrees of difficulty and adapted to the individual needs of the student will be given in connection with studies and exercises designed to bring about a close relationship between the physical and intellectual faculties. The works of the classic and romantic composers, both ancient and modern, will be studied according to the taste, inclination, and physical powers of the student. More advanced and graduate students will have the opportunity of playing with instructors in duos, trios, and quartettes.

All students are required to sustain satisfactory examinations before passing to the next higher grade.

This prescribed course requires about five years of the regular student of average ability; presuming practically no knowledge of the instrument when entering the School of Music, and also presuming some natural talent and considerable maturity of character and self-discipline.

Students not candidates for graduation may have the usual conservatory privilege of electing work freely, according to ability and preparation.

VOICE DEVELOPMENT

The production of a pure, resonant, and musical tone is only the result of patient and intelligent study; and the natural and easy control of the singing voice is obtained only by the correct use of the breath and the vocal organs. The study of neither the so-called Italian or German methods can produce the desired results, unaided by the careful and discriminating judgment of an in-

structor of wide experience, and one who has sufficient knowledge of physical conditions as to understand the proper relation and use of all the muscles involved (the diaphragm, the pectorals, costal, intercostal, and dorsal), and who knows how to *focus* and *place* the voice without contracting the throat or other muscles. Satisfactory results can only be secured by great skill on the part of the instructor, and wise discrimination on the part of the student. Solfeggi and other vocal exercises from eminent voice-builders will be employed, together with English, German, French, and Italian songs and ballads, leading up to the oratorio and the opera. Pupils thus become practical singers, and this acquaintance with the best vocal works prepares them for the oratorio and the operatic stage. This course requires three years.

VIOLIN, VIOLA, VIOLONCELLO

Probably no other instruments require so much patient and unremitting toil in their mastery as those above mentioned; and none are so well adapted for the expression of all shades of musical feeling or so nearly resemble the human voice with all its possibilities of tone-coloring.

The courses offered for the viola and 'cello are as comprehensive and thorough as those of other departments.

The course for the viola requires only about two terms, the pursuance of which will greatly increase the usefulness of the violinist.

The violoncello and double bass may be studied in courses corresponding to the general plan of other stringed instruments.

There will be an ensemble class in this department with weekly rehearsals, and those who are sufficiently advanced will be admitted to the University orchestra—a training field invaluable to the student for sight reading and in developing a musician-taste.

THE ORGAN

This department is under the personal supervision of the Director. This greatest and most complete of all musical instruments, not yet fully appreciated, has no comparison for grandeur and variety of effect, and is fast becoming a popular concert instrument. As an auxiliary to church worship, no instrument or combination of instruments approaches it.

Students cannot profitably take up the study of this instrument until they have acquired a good technique in the study of the pianoforte.

The course includes Rinck's School, Buck's phrasing studies, pedal studies by Volckmar, lessons in interlude playing, modulation and registration, sonatas of Merkel and Mendelssohn, and the best compositions of French, German, and English writers.

A two-manual pedal organ is at the service of students. It is sufficiently large to display the principles of organ playing and arrangements for the use of larger organs may be made.

The magnificent organ which was on exhibition at the Trans-Mississippi Exposition, and which was manufactured by the M. P. Moeller Organ Company, of Hagerstown, Md., has been presented to the University by the

generosity of its alumni, and is now temporarily located in Grant Memorial Hall.

This organ is a thoroughly modern instrument, having three manuals, forty-five stops, radiating pedals, pneumatic action, and composition pedals, it is architecturally beautiful and is without doubt one of the finest instruments in the west.

WIND INSTRUMENTS

Competent instructors are provided for those desiring to study the clarinet, flute, cornet, and band instruments. These may be taken as electives by those pursuing the regular course.

Guitar, mandolin, and banjo are taught by special instructors. In view of the increasing interest in these beautiful, though minor, instruments no pains will be spared to secure to the student the highest accomplishment possible.

PIANO TUNING

This is a field insufficiently covered, and presents to young women as well as young men an opportunity to gain useful knowledge which is in constant demand, especially in the West where tuners are few and their ability in many cases far below the demands of the public. Taken in connection with history of the piano, with harmony, sight reading, and practical work with all keyed instruments, piano tuning may be pursued in a more scientific manner than at a factory, where, at the end of a tedious apprenticeship, no knowledge has been acquired of different manufactures, of its history and

relative importance, nor of the collateral and indispensable knowledge of sight reading. The course covers one year and will include a regular course of sight reading (vocal), setting temperament, and other principles and practice of tuning, four terms of harmony and history, construction of the different methods of stringing and mechanism, reed organ tuning, voicing, and regulating.

Students cannot be admitted to this course for less than one year, and no student will be admitted who cannot readily distinguish different degrees of pitch.

LECTURES

Among the free advantages is a course of lectures upon musical topics by instructors of the School of Music and the University. Attendance upon this course will be required from all regular students.

CONCERTS

During the school year a number of concerts will be given, viz: The Choral series: University chorus and soloists in oratorio; Artists' series: Performers from abroad and the faculty; Chamber-music series: String trios, quartettes, and quintettes; semi-public soirees by instructors and pupils; weekly recitals by pupils for the acquirement of self-possession.

UNIVERSITY WORK

For students in regular University courses the studies of piano, voice culture, violin, or organ, together with the science of music, are made elective. See page ——

Students of the School may be matriculated as stu-

dents of the University, without examination, upon the payment of the usual fee of five dollars. This will entitle them to free instruction in all University courses which they are prepared to enter, and will give them all library, laboratory, and gymnasium privileges of University students. This is one of the most striking features of the School. It thus combines with music training, sound general education to the student, at very slight additional expense.

ADVANTAGES

The advantages in connection with University privileges are too numerous to mention here. The following, however, are worthy of notice: Sight-reading, chorus classes; lectures on history and other topics relating to music; orchestral practice; ensemble classes, prima vista reading piano classes. These, taken in connection with gymnasium, art privileges, use of libraries and reading room, are invaluable advantages which can only be fully appreciated by those who have been obliged to pay extra for them in other schools.

FEES

Tuition varies with the instructors. A complete schedule of fees will be sent on application.

SPECIAL COLLEGIATE COURSES

TEACHERS' COURSE

REQUIREMENTS FOR ADMISSION

This course may be elected by juniors and seniors pursuing regular courses in the College of Literature, Science, and the Arts and the Industrial College.

It is also open for all graduates of the advanced course of the State Normal School who have had at least one year's experience in teaching; to all graduates of the state high schools, accredited by the University, who have had at least two years' experience in teaching, and to others who can satisfy the heads of the departments concerned that they are sufficiently qualified to pursue the work with credit and with profit.

AIM

The aim of the course is to offer an opportunity to all those regular students who intend to enter the profession of teaching, and who wish, during their college course, by special and professional study, to prepare for positions of supervision and teaching in departments of higher education.

It also offers an opportunity to a large body of qualified teachers who wish to increase their efficiency by a more extended scholarship and a more thorough study

of educational problems in which they are particularly interested.

REQUIREMENTS

The course covers two years' work, or a total of thirteen University courses, to be divided as follows:

a. Special Knowledge. The completion of work amounting normally to five University courses in a subject or group of closely allied subjects which the student expects to teach; the ultimate decision as to the group of subjects and the student's proficiency resting with the head of the department most directly concerned.

The above work will include some instruction by the department with reference to the teaching of these subjects in the secondary schools.

b. Professional Knowledge. The completion of work in pedagogy amounting to two and two-fifths courses, and of work in psychology amounting to one and one-fifth courses; the courses to be designated by the heads of the departments concerned.

c. General Knowledge. Additional work sufficient to represent four and two-fifths courses (exclusive of the work representing special or professional knowledge) to be elected by the student from the departments of the University, under the advice of the head of the department of pedagogy and the head of the department with whom the student is taking his special work.

The University Teachers' Certificate will be granted to such graduates of the University as have satisfactorily completed all the requirements of the Teachers'

Course as outlined above, and have shown such marked proficiency in the special and professional subjects as to justify the Faculty in recommending them for the profession of teaching.

Students not graduates of the University completing this course will receive a statement of the fact, and be given proper credit for the work towards a degree.

The University Teachers' Certificate is recognized by the proper authorities in a number of states as sufficient evidence upon which to grant a teacher's license without further examination. Under section 10 (4792) of the school law of Nebraska as amended in 1897 the State Superintendent of Public Instruction is authorized to grant State Teachers' Certificates to such graduates of the University as have complied with the above requirements.

The law reads as follows:

"That all graduates of the University of Nebraska, holding the degree of Bachelor of Arts or Bachelor of Science, and in addition thereto certificates authorized by the Board of Regents showing that such graduates have completed the courses of instruction prescribed by the Regents and Faculty of said University for the special training and instruction of teachers, shall be accredited as qualified teachers within the meaning of the school law of this state; and all such graduates shall have equal privileges, upon equal conditions, with graduates from any and all other educational institutions within this state, under the school law thereof. Said certificates are hereby declared to be valid as certificates of the first grade, to teach in public schools in the State of Nebraska, for a period of three years from their date.

"After three years of actual teaching, the certificates of the graduates of the University of Nebraska, mentioned in section

one of this Act, shall be countersigned by the State Superintendent of Public Instruction upon satisfactory evidence that the service of the applicant has been successful and such countersignature shall make such certificates permanent; *provided*, that said countersignature may be canceled and its legal effect annulled by the Superntendent of Public Instruction, upon satisfactory evidence of disqualification; *prorided further*, that such certificates shall be subject to the provisions for lapsing set forth in section four, subdivision IX., of the school laws."

COURSE PREPARATORY TO LAW AND JOURNALISM

REQUIREMENTS FOR ADMISSION

Applicants for admission to this course must meet the requirements for admission to the regular undergraduate courses.

The course presumes much more maturity and special preparation than is expected in those entering the lower classes of the University, and students should consult the heads of the departments concerned before registering for the work.

FIRST YEAR

FIRST SEMESTER

American History, 3: 1785-1829	3 hours
English, 1	2 "
English, 3	2 "
English Literature, 5: General English Literature	3 "
or	
Science: (Elective)	2 "
Political Science, 1: Elementary Political Economy	3 "
Political Science, 15: English Economic History	3 "

SECOND SEMESTER

American History, 4: 1829-1865.....3 hours
English, 2 and 4.....4 "
English Literature, 6: Continuation of Course 5.....3 "
or
Science: (Elective) Continuation of work of first semester .....2 "
Political Science, 14.....3 "
Political Science, 16: Economic History of the United States .....3 "

SECOND YEAR

FIRST SEMESTER

American History, 9: Constitutional History.....3 hours
American History, 11: Constitutional Law.....3 "
English, 11: Public Speaking (Law).....2 "
or
English, 15: Journalism (Journalism) .....2 "
Philosophy, 3: Logic.....3 "
Political Science, 5: Financial History of the United States .....3 "
Political Science, 9: Municipal Government.....3 "

SECOND SEMESTER

American History, 10.....3 hours
American History, 12.....3 "
English: Continuation of work of first semester....2 or 3 "
Philosophy, 4 .....2 "
Political Science, 10: Money, Banking, and Bimetallism..3 "
Political Science, 12: Taxation.....3 "

COURSE PREPARATORY TO MEDICINE

REQUIREMENTS FOR ADMISSION

Applicants for admission to this course must pass satisfactory examinations in elementary English grammar, including spelling, capitalization, punctuation, and

pronunciation; arithmetic, algebra complete, plane geometry; descriptive and physical geography; elementary United States history; elementary Latin and twenty-nine chapters of the first book of Cæsar; and elementary botany, chemistry, and physics.

Some medical colleges in the country require a college degree for entrance, while in all the medical colleges the requirements are being steadily raised, and all students who can are advised to take the full college course (Industrial College Group 3) electing the subjects specified below.

Nevertheless, there are some students to whom, for various rasons, the full college course is an impossibility. To such students this course offers that part of college training which is of great technical value, and which is most immediately connected with the subsequent work of the medical school. The work outlined is in large part that which is included in the general study of the first year in the best schools.

Students who are registered in regular groups of the College of Literature, Science, and the Arts, or the Industrial College can elect this work and, in such case, it is advisable to distribute the work of the two years outlined below over the four years of the college course, so far as possible.

FIRST YEAR

FIRST SEMESTER

Botany, 2: Structural and Physiological, continued.....3 hours
Chemistry, 1: Study of the Metallic Elements.....2 "
English, 1: Rhetoric and English Composition.....2 "
Hygiene, 1 .....2 "

Physics, 1: Mechanics, Sound, and Heat.....3 "
Zoology, 1: General elementary course.....3 "
Zoology, 3: General Physiology.....2 "

SECOND SEMESTER

Botany, 2: Structural and Physiological, continued.....3 hours
Chemistry, 2: Study of the Metallic Elements, continued ....2 " "
English, 2: Rhetoric and English Composition, continued ....2 " "
Physics, 2: Mechanics, Sound, and Heat, continued.....3 "
Zoology, 2: General elementary course, continued.....3 "
Zoology, 8*a*: Osteology.....2 "
Zoology, 4: General Physiology, continued.....2 "

SECOND YEAR

FIRST SEMESTER

Botany, 19: Pharmaceutical Botany.....2 hours
Chemistry, 3: Organic Chemistry.....3 "
Philosophy, 1: Introductory Course in Psychology.....3 "
Physics, 3: Experimental Physics; continuation of Courses 1 and 2.....2 "
Zoology, 5: Invertebrate Morphology.....4 "
Zoology, 9: Normal Histology.....2 "
Zoology, 13: Neurology.....2 "

SECOND SEMESTER

Botany, 20: Pharmaceutical, continued.....2 hours
Chemistry, 4: Organic Chemistry, continued.....3 "
Philosophy, 2: Introductory Course in Psychology, continued ....3 "
Physics, 4: Experimental Physics, continued.....2 "
Zoology, 8: Comparative Anatomy of the Vertebrates...4 "
Zoology, 10: Vertebrate Embryology.....2 "
Zoology, 14: Neurology.....2 "

Students completing this course will receive certificates of their proficiency, and by special arrangement are admitted (without preliminary or entrance examina-

tions) to the third year and second course of lectures of the Cincinnati College of Medicine and Surgery; to the second year in the Boston University School of Medicine, the Medical School of the University of Pennsylvania, Omaha Medical College, Creighton Medical College, Hahnemann Medical College and Hospital of Chicago, and the Northwestern Medical School (Chicago Medical College); and to the first year in the St. Louis Medical College, and the Department of Medicine and Surgery, University of Michigan.

THE PREPARATORY MEDICAL SOCIETY

This society was organized for the encouragement of a medical school in the University at some future time, and for the sake of placing in some united relationship with the other student bodies of the University, those students in the Course Preparatory to Medicine.

COURSE IN PHYSICAL EDUCATION

This course may be elected by second, third, and fourth years pursuing regular courses in the College of Literature, Science, and the Arts, and the Industrial College. Students expecting later to elect this course should follow the suggested order of University Courses outlined for the General Scientific Group. This course is open also to graduates of other colleges, to all graduates of the advanced course of the State Normal School, and, under special circumstances, to a limited number of unclassed students.

The course is designed to meet the need of students

who wish to prepare for the work of Physical Director in colleges, secondary schools, Young Men's Christian Associations, and Young Women's Christian Associations. It is intended also to prepare teachers designing Physical Training as an accessory subject to their equipment for preparatory schools and public schools, including high, grammar, and primary school grades. So rapid is the advance of the latest and best views of public education in Nebraska that a very few years should make Physical Education a necessary part of the preparation of every well-trained teacher.

Students preparing for physical work in Y. M. C. A.'s and Y. W. C. A.'s will find it possible to obtain most of the accessory training in the English Bible in special courses at the University. Association technique may be obtained by spending a half year at Association fitting schools.

REQUIREMENTS FOR ADMISSION

For those students who are candidates for a college degree and who desire a regular certificate for a course in Physical Education, the four years' work should be distributed as follows: for the first year the courses outlined for that year in the General Scientific Group; for the second, third, and fourth years the required work of the General Scientific Group, with two exceptions, zoology Courses 1, 2, 3, and 4, are to be substituted for botany and geology required in this group.

Electives are to be applied each year to the special and professional work outlined below under the Course in Physical Education.

COURSE IN PHYSICAL EDUCATION

SECOND YEAR

First Semester

Hygiene, 1 .....2 hours
Physical Education-Theory, 1*a*: Measurements and Charts .....1 hour
Physical Education-Practice, 13: Hygienic Gymnastics..1 "
Physical Education-Practice, 19: Special Athletic Training .....1 "

5 hours

Second Semester

Physical Education-Theory, 2: Course 1, continued.....1 hour
Physical Education-Practice, 14: Continuation of Course 1 .....1 "
Physical Education-Practice, 20: Continuation of Course 19 .....1 "
Zoology, 8*a*: Comparative Osteology.....2 hours

5 hours

THIRD YEAR

First Semester

Physical Education-Theory, 3: Physiology of Bodily Exercise .....3 hours
Physical Education-Theory, 5: Physical Diagnosis.....2 "
Physical Education-Practice, 15: Educational Gymnastics .....1 hour

6 hours

Second Semester

Physical Education-Theory, 6: Prescription of Exercise.2 hours
Physical Education-Theory, 10: Kinesiology.....3 "
Physical Education-Practice, 16: Educational Gymnastics .....1 hour

6 hours

FOURTH YEAR

First Semester

Physical Education-Theory, 3*a*: Training.....1 hour

Physical Education-Theory, 9: Methods and Equipment, 2 hours
Physical Education-Theory, 11: History of Physical Education .....3 "
Physical Education-Practice, 17: Leader's Practice.....1 hour

7 hours

Second Semester

Pedagogy, 8: Educational Psychology.....2 hours
Physical Education-Theory, 4: Emergencies.....1 hour
Physical Education-Theory, 12: Anthropometry.....3 hours
Physical Education-Practice, 18: Leader's Practice.....1 hour

7 hours

Young women will substitute Course 7 for Military Drill and Course 8 for Physical Education-Practice Courses 19 and 20.

Students not taking college degrees or holding such from institutions of equal rank, who are permitted to take the courses in Physical Education, will complete the work prescribed below. Such unclassed students will be required to take the following preparation for this course:

Chemistry, 1 and 2.....4-5 Courses
English, 1 and 2.....4-5 "
Physics, 1 and 2.....6-5 "
Military Drill, 1 and 2.....2-5 "

Total .....3 1-5 "

PRESCRIBED WORK IN PHYSICAL EDUCATION FOR UNCLASSED STUDENTS

FIRST YEAR

First Semester

English, —: (second year).....3 hours
Hygiene, 1: Natural, Public, and Personal.....2 "
Physical Education-Theory, 1*a*: Measurements and Charts .....1 hour

Physical Theory, 3: Physiology of Bodily Exercise.....3 hours
Physical Practice, 13: Hygienic Gymnastics.....1 hour
Physical Practice, 19: Special Athletic Training.....1 "
Zoology, 1: Introductory Course.....3 hours
Zoology, 3: Physiology.....2 "
16 "

Second Semester

Drill, —: Military (second year).....1 hour
English, —: (second year).....3 hours
Physical Education-Theory, 2: Measurements and Charts .....1 hour
Physical Theory, 10: Kinesiology.....3 hours
Physical Education-Practice, 14: Hygienic Gymnastics, continued .....1 hour
Physical Practice, 20: Special Athletic Training, continued .....1 "
Zoology, 2: Introductory Course, continued.....3 hours
Zoology, 4: Physiology, continued.....2 "
Zoology, 8*a*: Osteology.....2 "
17 "

SECOND YEAR

First Semester

Philosophy, 1: General Psychology.....3 hours
Physical Education-Theory, 5: Physical Diagnosis.....2 "
Physical Education-Theory, 3*a*: Training.....1 hour
Physical Education-Theory, 9: Methods and Equipment.2 hours
Physical Education-Theory, 11: History and Philosophy of Physical Education.....3 "
Physical Education-Practice, 15: Educational Gymnastics .....1 hour
Physical Education-Practice, 17: Leader's Practice.....1 "
Zoology, 11: Mammalian Anatomy.....3 hours
16 "

Second Semester

Pedagogy, 8: Educational Psychology.....2 hours
Philosophy, —: Physiological Psychology.....3 "
Physical Training-Theory, 6: Prescription of Exercise...2 "

Physical Training-Theory, 4: Emergencies.....1 hour
Physical Training-Theory, 12: Anthropometry.....3 hours
Physical Training-Practice, 16: Educational Gymnastics, continued .....1 hour
Physical Training-Practice, 18: Leader's Practice, continued .....1 hour
Zoology, 12: Mammalian Anatomy, continued.....3 hours

16 "

A University certificate of the completion of this course in Physical Education will be granted to graduates of the University who have satisfied all the requirements of the above courses and whose faithful work in general, special, and professional subjects proclaim them worthy to receive from the faculty such a recommendation.

Graduates from other Universities and Colleges of equal rank with The University of Nebraska will receive a like certificate upon the same terms as graduates of this institution.

Students not graduates of the University or of institutions of equal rank who complete this course will receive a statement to that effect and be given credit for the work towards a degree.